



Kelly Lively, INL department manager for Radioisotope Power Systems, began in INL human resources before deciding to go back to school for a technical degree.

Idaho Falls engineer launches into history

By Alexandra Branscombe for *INL Communications & Governmental Affairs*

The wall of fame outside Kelly Lively's office door displays photos of some of Idaho National Laboratory's top nuclear power systems professionals proudly displaying their largest silvery trophies: cutthroat trout, kokanee salmon and other enormous sport fish. Though Lively has gained local notoriety as "that space battery lady," her interests range from the rovers exploring space to the creatures swimming in Idaho's bountiful lakes and rivers.

Lively is the department manager for Radioisotope Power Systems at INL, and has already participated in two NASA launches. But collaborating with NASA was never her plan.

She worked her way from INL human resources to a technical position before deciding to go back to school for a technical degree. Even then, said Lively, with a general engineering degree from a small Idaho school, she never expected to be a leader in space nuclear history. Yet now she plays a central role in projects that form the literal heart of deep-space missions.

Takeoff

Lively can still remember the excitement of her first rocket launch — the Pluto New Horizons mission in 2006. It was INL's first project assembling and testing a radioisotope power system to go into the far reaches of the solar system. She joined the team in 2004 and was lead engineer, traveling with the mission's generator to Kennedy Space Center in Florida. Their job was to resolve any problems or issues that could occur on the road as the power system was being transported.

"I remember thinking if I got two hours of sleep a night I was doing great," she recalled. "But I just couldn't sleep more than that, the excitement was too great."

The first time in an enormous space center, while simultaneously being responsible for a multimillion-dollar space battery, might have been more than a little stressful for most engineers.

"Seeing that launch and seeing what you worked on for so many years go into space is so thrilling, it is certainly a high point," said Lively.

The rate of acceleration is determined by the force acting on it — for Lively, the career-accelerating force was her own motivation. After the Pluto Horizons launch, Lively was promoted to project manager for the Multi-Mission Radioisotope Thermoelectric Generator: a Radioisotope Power System that would fuel a two-year Mars mission.

The MMRTG was a totally new challenge. The generator had to power a SUV-sized rover on a \$2.5 billion dollar mission. For the next six years, the team of engineers worked over weekends and holidays to test and assemble the heat-generating power system that would run continuously on the distant red planet.

The cylindrical power system was 2 feet tall, 2 feet in diameter and filled with plutonium-238. The radioisotopes generate heat, which is converted to electricity that powers the rover's scientific instruments, arms and wheels while also recharging the lithium-ion batteries on board.

On Aug. 6, 2012, all the hard work paid off as the team watched the Mars Science Laboratory successfully land the rover Curiosity in Gale Crater.

"Each space battery and each work experience has been exciting and challenging," Lively said, touching a small toy model of Curiosity on her



The INL Curiosity Rover Team has won a multiple awards for work supporting the Mars Science Laboratory launch, landing and exploration.

desk. "I never expected that I would someday be working with NASA."

Preparation to Launch

Lively has all but grown up at INL. At 18, she had just graduated high school when her parents moved to Idaho Falls from a small town in Illinois. Since her plan to attend an Illinois junior college had been thwarted, she turned her eye toward Idaho Falls opportunities.

"I heard that the place to work was the INL," said Lively, "so I ended up employed at [the Naval Reactors Facility] for Newport News Shipbuilding as a secretary in human resources," a position that couldn't have been further from her engineering future.

Soon, Lively transferred to the engineering department to work typing operating procedures for the Navy's submarine prototype training. This was the job that sparked Lively's interest in engineering.

"I became interested in the procedures as I typed them, and I thought, 'I can do this,'" said Lively.

From then on, she sought out more challenging career opportunities: personnel security representative processing clearance paperwork, quality assurance inspector and nondestructive testing specialist. But soon, even this momentum did not satisfy her. Lively decided it was time to go back to school.

While still working summers at INL, she became an electrical engineering student at Idaho State University. After graduating in 1998, Lively landed a position in INL's design engineering department, where she grew her skills. Her work impressed Steve Johnson, director of the Space Nuclear Systems and Technology Division. He asked her to join his division. In 2004, she joined Johnson's team and supported testing and delivery of the radioisotope power systems for Pluto New Horizons.

"It has been wonderful watching Ms. Lively grow professionally over the years," Johnson said. "She has exceeded my expectations for making contributions to the Radioisotope Power Systems Program here at INL and on the national level."

Since then, Lively has become part of nuclear history. In 2012, the INL Curiosity Rover Team won the Nuclear Energy Advocate Award for exceptional leadership in capturing the world's imagination through the Mars Science Laboratory launch, landing and exploration. In the same year, the MMRTG team won the DOE Secretary's Honor Award. Last week, Lively received a Girl Scouts of Silver Sage Women of Today and Tomorrow award for her leadership on the project.

In Orbit

When not at the lab, Lively will most likely be found on her 20-foot boat holding a fishing rod. She isn't particular to any one kind of sport fishing — trolling, cast-fishing, bait fishing are all fair game. Supporting her children's activities is another favorite pastime; her son plays high school soccer as a goalie, and her daughter is following in her footsteps as an engineering student at Idaho State University.



Lively shows off a nice catch from Henry's Lake, an Idaho favorite near Yellowstone National Park.

Lively hopes her story will inspire others to take charge of their professional careers. "I encourage others to go back to college, it is never too late to learn," she said. "You have got to keep your eyes open, and take opportunities along the way — no one can manage your career as well as you can."

Lively also loves engaging students of all ages, including hosting school groups or visiting classrooms to speak to children about science and engineering. She always brings a collection of gadgets and gizmos to engage them.

"Something that our country can do in our school systems is to make STEM (science, technology, engineering and math) classes more applied; making that connection between learning and applying math and science," mused Lively. "When I go talk at schools, I make it as hands-on as I can."

Even with all the accomplishments under her belt, Lively has no plan for slowing down. She is now the department manager and the project manager for Advanced Stirling Radioisotope Generator (ASRG), the next generation of nuclear power system. It boasts the ability to more efficiently convert heat to electricity with less than a quarter of the plutonium of MMRTG. The potential launch date for the next Mars rover is not until 2020, but to meet this goal, a plethora of projects must be accomplished first.

But that's OK — Lively relishes hard work. "It is like putting together a big puzzle — every day there is a different challenge to overcome," she said with a smile. "It is a huge sense of pride and accomplishment. I couldn't be more blessed (than) to be working in this program."

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